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FISHES FROM THE MIDDLE ATLANTIC STATES
AND VIRGINIA

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A large number of fishes have been examined and studied by the writer while on local trips in the middle Atlantic States and Virginia, in 1917. Where desirable, material was saved, properly prepared and sent or brought to Philadelphia, and placed in the Academy of Natural Sciences of Philadelphia. Many specimens represent new and interesting locality records, some new additions to faunas of the river systems or streams, and a resumé is therefore given, the species grouped under their respective states.

NEW JERSEY

On August 16 a small collection was made at Manasquan. October 5 Mr. S. G. Gordon collected a few fishes in the West Branch of the Popakating Creek of the Walkill basin in Sussex County. October 20 and 21, with Messrs. E. S. and W. I. Mattern and H. W. Pretz, the writer made an extended trip

through the upper portions of the state and collected in various places as follows: Musconetcong River between Hackettstown and Washington; tributary in Raritan basin over ridge east of German Valley; tributary in Raritan basin east of Chester; Rockaway River at Boonton; tributary of Cranberry Lake; Stanhope Lake at Nectong; tributary of Pequest River at Andover Junction; Stickle Pond, midway between Andover Junction and Newton, in Pequest basin; west shore of Swartswood Lake; lower outlet of Swartswood Lake; Trout Brook, a tributary of the Paulin's Kill; first tributary above Stillwater in the Paulin's Kill; Paulin's Kill mile below Stillwater; Yards Creek, a tributary of the Paulin's Kill at Hainesburg; Paulin's Kill at Hainesburg; Beaver Brook in the Pequest River Basin; Pequest River above Buttsville.

Entosphenus cpypterus (Abbott).—On April 28, Mr. S. N. Rhoads secured a number of examples near Haddonfield. The precise locality is 150 feet below a spring head, a tributary of Cooper's Creek in Camden County, in a gravelly ravine half-way between Haddonfield and Ellisburg. These lampreys were spawning at a point in this brook about fifty yards from the creek, and at this point the elevation was about ten feet above the creek's level. The occurrence of this species in the Delaware River basin is of local interest, and these are the first undoubted specimens to be so recorded.

Carcharias taurus Rafinesque.—The jaws of a large example taken below Fortescue in the Delaware Bay, in October.

Mustelus mustelus (Linnæus).—Manasquan.

Raja erinacea Mitchell.—Manasquan.

Raja cglanteria Lacépède.—Manasquan.

Myliobatis freminvillii LeSueur.—One at Sea Isle City, August 7, reported by Mr. W. J. Fox.

Pomolobus mediocris (Mitchill).—Longport.

Brevoortia tyrannus (Latrobe).—Manasquan.

Salvelinus fontinalis (Mitchill).—Trout Brook and Paulin's Kill at Hainesburg.

Scmotilus bullaris Rafinesque.—Paulin's Kill at Hainesburg.

Scmotilus atromaculatus (Mitchill).—West Branch of Popakating Creek; Musconetcong River above Washington; Raritan tributary east of German Valley and another east of Chester; Andover Junction; Paulin's Kill tributary above Stillwater; Yards Creek; Paulin's Kill at Hainesburg.

Abramis crysolucas (Mitchill).—Stickle Pond.

Notropis cornutus (Mitchill).—Musconetcong River above Washington; Raritan tributary east of Chester; Andover Junction; Trout Brook; Paulin's Kill tributary above Stillwater; Paulin's Kill mile below Stillwater.

Notropis chalybaeus (Cope).—Andover Junction.

Rhinichthys cataractæ (Valenciennes).—Musconetcong River above Washington.

Rhinichthys atronasus (Mitchill).—West Branch of Popakating Creek; Musconetcong River above Washington; Raritan tributary east of German Valley and another east of Chester; Trout Brook; Paulin's Kill tributary above Stillwater; Paulin's Kill mile below Stillwater; Yards Creek; Paulin's Kill at Hainesburg.

Catostomus commersonnii (Lacépède).—Boonton; Trout Brook; Paulin's Kill tributary above Stillwater; Paulin's Kill mile below Stillwater; Yards Creek.

Catostomus nigricans LeSueur.—Raritan tributary east of Chester.

Erimyzon succetta oblongus (Mitchill).—West branch of Popakating Creek and Swartswood Lake.

Ameiurus nebulosus (LeSueur).—Swartswood Lake outlet.

Schilbeodes gyrinus (Mitchill).—Tributary of Cranberry Lake; Stickle Pond, and Swartswood Lake outlet.

Esox americanus Gmelin.—Boonton; Nectong; Swartswood Lake outlet.

Esox reticulatus LeSueur.—Nectong.

Umbra pygmaea (DeKay).—Clementon (Dr. P. P. Calvert).

Fundulus heteroclitus macrolepidotus (Walbaum).—Manasquan and Cape May.

Lucania parva (Baird).—Manasquan.

Cyprinodon variegatus Lacépède.—Manasquan.

Menidia menidia notata (Mitchill).—Manasquan.

Mugil curema Valenciennes.—Longport.

Blepharis crinitus (Mitchill).—Adult from Ocean City.

Pomoxis sparoides (Rafinesque).—Nectong.

Enneacanthus gloriosus (Holbrook).—Abundant at Swartswood Lake outlet.

Lepomis auritus (Linnæus).—Nectong; Andover Junction; Swartswood Lake outlet; Trout Brook; Paulin's Kill mile below Stillwater.

Pomotis gibbosus (Linnæus).—Boonton; Nectong; Andover Junction; Stickle Pond; Swartswood Lake outlet; Yards Creek.

Micropterus salmoides (Lacépède). — Boonton; Nectong; Swartswood Lake outlet; Paulin's Kill at Hainesburg; Beaver Brook.

Perca flavescens (Mitchill).—Nectong.

Boleosoma nigrum olmstedii (Storer). — Musconetcong River above Washington; Raritan tributary east of Chester; Andover Junction; Trout Brook; Paulin's Kill at Hainesburg and below Stillwater; also Yards Creek and Buttsville.

***Upeneus phillipsi*, new species**

FIG. 1

Description: Head $3\frac{1}{2}$; depth $3\frac{2}{5}$; D. VIII-I, 8, 1; A. I, 6, 1; P. 11, 14; V. 1, 5; scales 30 in lateral line to caudal base and 3 more on latter; 3 scales above lateral line to spinous dorsal origin, also same to soft dorsal origin; 6 scales below lateral line in vertical series to spinous anal origin; about a dozen predorsal scales; head depth at occiput $1\frac{1}{6}$ its length; head width 2; snout $2\frac{7}{8}$; eye $3\frac{7}{8}$; maxillary $3\frac{1}{3}$; interorbital $3\frac{1}{4}$; mandible $2\frac{1}{2}$; second dorsal spine $1\frac{3}{5}$; first ray of second dorsal fin $1\frac{7}{8}$; least depth of caudal peduncle $2\frac{1}{4}$; caudal along upper lobe 1; first anal ray $2\frac{1}{8}$; pectoral $1\frac{2}{5}$; ventral $1\frac{1}{3}$.

Body elongate, compressed, contour rather fusiform, though greatest depth about spinous dorsal origin. Caudal peduncle compressed, elongate, least depth about half its length.

Head well compressed, rather deep, upper profile little more inclined than lower, and flattened sides not constricted above or below. Snout obtuse or convex in profile, and length about $\frac{7}{8}$ its width. Eye high, close to upper profile, rounded and hind edge nearly midway in head length. Mouth small, terminal below and upper jaw but slightly protruding. Lower jaw deep, and mandibular rami well elevated inside mouth. Maxillary with posterior half exposed, expansion $\frac{2}{3}$ of eye, and nearly reaches opposite front pupil edge. At least a row of very low obscure simple teeth in upper jaw. In lower jaw

row of minute short teeth, and some may be partly biserial. Fine teeth on vomer and palatines. Lips moderate. Two rather stout chin barbels extend back about opposite hind edge of preopercle below. Nostril about midway in snout length. Interorbital depressed, or nearly level. Preorbital moderately broad, its width slightly greater than eye. Preopercle edge entire.

Gill-opening extends forward nearly opposite front eye edge. Rakers $6 + 15$, lanceolate, and largest $2/3$ of filaments, latter $3/4$ of eye. Pseudobranchiae nearly long as gill-filaments. Isthmus narrowly constricted, rather long, and with median lengthwise furrow.

Scales large, mostly uniform, finely ctenoid, rather narrowly imbricate and in nearly even lengthwise series. Head largely scaly, and cheek with 3 rows of scales. Axil of ventral with pointed scale about $1/4$ of fin, and rounded scale between fin bases of similar length. Vertical fins largely depressible close to or as if below scales of adjacent regions. Lateral line complete, largely concurrent with dorsal profile. Tubes of lateral line little branched, or simple in most cases, and extend well over scale exposure.

Spinous dorsal origin nearly at first third between snout tip and caudal base, spines rather firm, and second longest, though depressed fin reaches $2/3$ to soft dorsal. Latter inserted about midway between hind preopercle edge and caudal base, first ray longest with others graduated down behind, though not extending so far posteriorly as tip of last ray, and depressed fin $1\frac{3}{4}$ to caudal base. Caudal forked, upper lobe slightly longer than lower. Anal inserted about midway between caudal base and pectoral origin, first ray longest and others graduated down behind. Pectoral rather

pointed, reaches $1\frac{3}{5}$ to anal. Ventral origin about opposite that of pectoral and fin reaches nearly $\frac{2}{3}$ to anal.

Color in alcohol pale brownish with slight yellowish tinge, and dusted with pale dusky largely along each scale edge on upper surface or back. Side of head silvery or whitish, and side of trunk largely rosy pink, especially abdomen. Iris pale or whitish, with pinkish tints. Spinous dorsal pale or grayish-white crossed by three dusky horizontal bands, each made up of variable black dots, first band basal, second medially and third near apex. Soft dorsal similar, only dusky bands oblique, as uppermost along upper edge of fin so that others parallel. Anal whitish, with slight median transverse dusky tint composed of several dark chromatophores on each ray. Pectoral and ventral both pale or gray-white, and caudal of similar tint, except three broad dusky bands across each caudal lobe.

Length 70 mm.

Type Specimen: No. 47,448, A. N. S. P., Corson's Inlet, Cape May County, New Jersey, August 11, 1917. Dr. Richard J. Phillips.

Remarks: The above example appears to be unique. It was obtained in the bait net on the inside beach. In life Dr. Phillips noted the scales as round, thin and easily detached. Its color at that time was greenish-grey above, and white below. The lateral line was marked by a salmon colored band prolonged through the eye. Coarse flecks of salmon color were on the lower part of the sides. Iris partly of same color, which is best described as a deep salmon shade.

This species appears allied, if not identical with *Upeneus parvus* Poey. It is said to have the maxillary reaching the front of the eye, a yellow longitudinal band along side with similar narrower streaks below, two dusky cross-bands on the

second dorsal and five on each caudal lobe. This species has not been secured since Poey described it.¹

U. phillipsi differs from the next species in the much larger maxillary, and the dark bars on the soft dorsal and caudal.

(For Dr. Richard J. Phillips of Philadelphia, who collected the type.)

Upeneus maculatus (Bloch).—On July 12, 1903, I seined an example about 82 mm. long at Stone Harbor, which I wrongly referred² to *Mullus auratus* (Jordan and Gilbert). Though now in very poor preservation it seems to belong to the present species. A row of small short teeth are seen along the upper jaw edge, not noticed originally. This record, therefore, adds another species to the New Jersey fish fauna.

Cynoscion regalis (Schneider).—Manasquan.

Bairdiella chrysura (Lacépède).—Manasquan.

Prionotus evolans strigatus (Cuvier).—Manasquan.

Merluccius bilinearis (Mitchill).—During early June many were washed ashore, usually at night, at Seaside Heights.

PENNSYLVANIA

About thirty-five localities are included below, represented by twelve in Indiana County, where material was gathered by Mr. R. W. Wehrle (North Branch of Brush Run, Little Mahoning Creek, Penn, McKee, Smith, Shafer, Stephen, Laurel, Miller, McDonnell, Brush and Graff Runs). Thirteen lots were sent by Messrs. E. S. and W. I. Mattern, from extended trips in the Delaware River basin in Berks County (stream near Lime Kiln Run in Oley Township and Manatawney Creek), and along the middle Susquehanna River basin in Berks County (Little Swatara Creek and its tributary Stone Creek,

¹ Mem. Hist. Nat. Cuba, T. 1851, p. 226.

² Rept. N. J. State Museum, 1905 (1906), p. 327.

and branch of Cross Kill Creek near Meckville), in Snyder County (Middle Creek and Susquehanna River near Chapman), in Dauphin County (creek near Stone Glen, Beaver Creek, Armstrong Creek above Halifax, Manada Creek near Manadahill, and Powell Creek near Inglenook), and Lebanon County (Little Swatara Creek near Jonestown). June 23 and 24 the writer accompanied Messrs. Mattern through Carbon County (tributary of the Big Lehigh near Hudsonale, and another tributary two miles from White Haven, Lesley's Run which is a tributary of the Big Lehigh between Weatherly and White Haven, and the Pohopoco Creek), Luzerne County (Nescopeck Creek headwaters four miles north of White Haven, Wapwalopin Creek headwaters five miles north of White Haven, Solomon Creek at Solomon Gap, Harvey Creek near West Nanticoke), and Columbia County (Briar Creek, which is a tributary of the Susquehanna below Berwick, and the Susquehanna at Bloomsburg). Though a large number of collections were made nearer Philadelphia, they are omitted as of lesser importance. Also a number of streams were visited and examined which were in part or entirely polluted, and, as no collections were obtained from them, a great amount of work necessary in such cases does not appear in this report.

Salvelinus fontinalis (Mitchill).—Near Hudsonale; Lesley's Run; Nescopeck and Wapwalopin headwaters, and Solomon Creek.

Camptostoma anomalum Rafinesque.—Penn Run and Little Mahoning Creek, in Indiana County. Messrs. Mattern seined an example in Briar Creek on June 23, which is the first record for the Susquehanna River basin, thereby also establishing the most eastern point at which this remarkable cyprinoid oc-

curs. Although it was found associated with other small fishes, which were abundant in the water course, and prolonged and careful search was made, no other example could be located. The precise locality was in the lower course of the stream, where shallow and with gentle current and the bottom mostly gravelly or muddy. An examination of the viscera reveals with certainty that it belongs to the present species.

Pimephales notatus (Rafinesque).—Little Mahoning Creek; Brush, Penn, McKee, Smith, Shafer and Stephen Runs; Stone, Little Swatara, Middle, Beaver and Armstrong Creeks.

Scotilus bullaris (Rafinesque).—Briar Creek; Bloomsburg and tributary of the Susquehanna; Stone Glen; Armstrong Creek; Inglenook, and Jonestown. Also in Pohopoco Creek.

Scotilus atromaculatus (Mitchill). — Little Mahoning Creek; Brush, North Branch of Brush, Laurel, Miller, McDowell, Graff, Penn, McKee, Smith, Shafer and Stephen Runs; Briar Creek; Bloomsburg; Little Swatara; Manatawney Creek; Meckville; Middle Creek; Chapman; Beaver and Armstrong Creeks; Manadahill and Inglenook.

Leuciscus elongatus (Kirtland).—Little Mahoning Creek; Brush, North Branch of Brush, McDonald, Penn and McKee Runs.

Abramis crysoleucas (Mitchill).—Stone, Little Swatara and Middle Creeks, near Lime Kiln.

Notropis bifrenatus (Cope).—Near Lime Kiln Run.

Notropis procne (Cope).—Briar, Stone and Little Swatara Creeks; Meckville; Middle Creek; Chapman; Beaver Creek; Manadahill; Jonestown; near Lime Kiln.

Notropis hudsonius amarus (Girard).—Bloomsburg and

Susquehanna tributary; Stone and Little Swatara Creeks; Meckville; Middle Creek; Chapman; Beaver and Armstrong Creeks; Manadahill, and Jonestown.

Notropis whipplii analostanus (Girard). — Briar, Stone and Little Swatara Creeks; near Lime Kiln Run; Manatawney Creek; Meckville; Middle Creek; Stone Glen; Chapman; Beaver and Armstrong Creeks; Inglenook, and Jonestown.

Notropis cornutus (Mitchill). — Little Mahoning Creek; Brush, North Branch of Brush, Smith and Shafer Runs; Briar Creek; Bloomsburg and Susquehanna tributary; Stone and Little Swatara Creeks; near Lime Kiln Run; Manatawney Creek; Meckville; Middle, Beaver and Armstrong Creeks; Manadahill; Inglenook, and Jonestown. Also in Pohopoco Creek.

Notropis photogenis amarus (Abbott). — Bloomsburg; Middle Creek; Chapman, and Manadahill. Six interesting males in full nuptial colors were seined in the Little Swatara, July 8. Among the multitudes of individuals I never before noticed this coloration and therefore give the following description: Whole head above and anterior part of body with faint blushes of rosy to blood-red, latter tint bright and deep over whole of muzzle and about gill opening, also at pectoral base. Dorsal base orange red, and similar, though paler, tints at bases of pectoral and anal. Costal region with pale orange tint, lilac in some lights, and all overlaid by the brilliant silvery white sheen so prevalent in this species. Iris blood shot. These males are 46 to 66 mm. in length. Some were more brilliant than others and had the head quite red. Its usual coloration would give no clue to such a livery.

Notropis rubrifrons (Cope). — Little Mahoning Creek, where abundant.

Ericymba buccata Cope.—McKee Run.

Rhinichthys cataractæ (Valenciennes). — Harvey, Briar, Little Swatara, Middle and Beaver Creeks; Manadahill, and Jonestown. Small ones from Little Mahoning Creek.

Rhinichthys atronasus (Mitchill).—Brush, North Branch of Brush, Laurel, Graff, Penn, McKee, Smith and Stephen Runs, and Little Mahoning Creek; Nescopeck and Wapwalopin headwaters; Solomon, Harvey and Briar Creeks; near Lime Kiln Run; Meckville; Middle Creek; Stone Glen; Beaver Creek; Manadahill; Inglenook; near Hudsonale and White Haven; Lesley's Run; Pohopoco Creek, and near Chestnut Hill.

Hybopsis kentuckiensis (Rafinesque).—Stone, Little Swatara, Middle and Armstrong Creeks; Manadahill; Inglenook, and Jonestown.

Exoglossum maxillingua (LeSueur).—Harvey and Briar Creeks; Susquehanna tributary at Bloomsburg; Stone and Little Swatara Creeks; near Lime Kiln Run; Meckville; Middle, Beaver and Armstrong Creeks; Manadahill; Inglenook, and Jonestown.

Catostomus commersonii (Lacépède).—Brush, North Branch of Brush, Miller, McDonald, Penn, McKee, Smith, Shafer and Stephen Runs; Little Mahoning Creek; Solomon and Briar Creeks; Susquehanna tributary at Bloomsburg; Stone and Little Swatara Creeks; near Lime Kiln Run; Manatawney Creek; Meckville; Middle, Beaver and Armstrong Creeks; Jonestown; Manadahill; Inglenook; Lesley's Run, and Pohopoco Creek.

Catostomus nigricans LeSueur. — Little Mahoning Creek; Briar, Stone and Little Swatara Creeks; Meckville; Middle and Beaver Creeks; Jonestown; Manadahill.

Erimyzon sucetta oblongus (Mitchill).—Inglenook, and Susquehanna tributary at Bloomsburg.

Moxostoma aureolum (LeSueur).—Little Mahoning Creek and Shafer Run.

Esox americanus Gmelin. — Susquehanna tributary at Bloomsburg.

Esox reticulatus LeSueur.—Little Swatara Creek and Jonestown.

Fundulus diaphanus (LeSueur).—Briar and Little Swatara Creeks; near Lime Kiln Run; Manatawney Creek; Middle and Beaver Creeks.

Ambloplites rupestris (Rafinesque). — Little Mahoning Creek.

Lepomis auritus (Linnæus).—Stone and Little Swatara Creeks; near Lime Kiln Run; Manatawney Creek; Middle Creek; Chapman; Inglenook, and Jonestown.

Lepomis incisor (Valenciennes).—One from the Hosensack near Allentown, August 16, the first met with.

Pomotis gibbosus (Linnæus). — Shafer Run in Indiana County; Stone Creek, and Jonestown.

Enneacanthus gloriosus (Holbrook).—Jonestown.

Micropterus dolomieu Lacépède.—Near Lime Kiln Run.

Micropterus salmoides (Lacépède).—Inglenook.

Hadropterus peltatus (Cope).—Little Swatara and Middle Creeks, and Manadahill.

Bolcosoma nigrum Rafinesque.—Brush, North Branch of Brush, McDonald, Penn, McKee, Shafer, Smith and Stephen Runs.

Boleosoma nigrum olmstedii (Storer).—Harvey and Briar Creeks; Bloomsburg and Susquehanna tributary; Stone and Little Swatara Creeks; near Lime Kiln Run; Manatawney

Cr  ek; Meckville; Middle Creek; Stone Glen, Beaver and Armstrong Creeks; Pohopoco Creek.

Pacilichthys flabellaris (Rafinesque).—Brush Run and Little Mahoning Creek.

Cottus ictalops (Rafinesque).—Laurel, Penn and McKee Runs.

DELAWARE

During the summer a number of the more common fishes were observed, some in numbers, at Lewes, and reported by Mr. Charles S. Abbott, Jr. They are *Mustelus mustelus* (Linn  us), *Eulamia milbertii* (M  ller & Henle), *Sphyrna zygaena* (Linn  us), *Raja eglanteria* Lac  p  de, *Asciopenser sturio* Linn  us, *Brevoortia tyrannus* (Latrobe), *Tylosurus marinus* (Walbaum), *Centropristis striatus* (Linn  us), *Cynoscion regalis* (Schneider), *Micropogon undulatus* (Linn  us), *Spheroides maculatus* (Schneider), *Paralichthys dentatus* (Linn  us), *Lophius piscatorius* Linn  us.

MARYLAND

Mr. W. I. Mattern made a small collection at Ocean City in Sinnepuxent Bay, during late August, and sent the following: *Fundulus majalis* (Walbaum), *Fundulus heteroclitus macrolepidotus* (Walbaum), *Lucania parva* (Baird), *Cyprinodon variegatus* Lac  p  de, *Gambusia affinis* (Baird and Girard), *Menidia beryllina* (Cope).

VIRGINIA

May 12 to 16 was spent with Mr. I. N. DeHaven as his guest at Long Point Island in Magothy Bay, Northampton County. Mr. DeHaven assisted me in every way to study and collect fishes in the region. The first day a few species were

noted at Cape Charles City, all of which, however, are mentioned in Mr. Barton A. Bean's list³ of 1891. About Long Point Island we met with several species Mr. Bean did not have. May 16 Mr. DeHaven and I collected along and on Smith Island.

I include under this caption a small collection of fresh water fishes obtained at Midway Mills of the James River drainage, in Nelson County, November 25-27, 1915, by Mr. E. R. Dunn, also a similar lot of material from Piney Creek, a tributary of the Potomac in Loudoun County, which I visited August 6, 1916. The latter is a rapid rocky stream just below Harpers Ferry.

Carcharias taurus Rafinesque.—Smith Island.

Mustelus mustelus (Linnæus).—Fig. 2. Abundant about Smith Island on May 16. Several were caught May 15 with unborn young. We saw ten adult pregnant females, and no males. Some were caught on lines and others were dragged ashore in the hauling-seines. In size these sharks were fully adult, or about three feet long. Of the six we opened all were found with living young, in most cases eight within a female or four in each "uterus." Externally the adult female did not appear swollen, or but slightly more robust than males of the same size observed elsewhere. They took the crab-bait intended for "trout" (*Cynoscion regalis*), with the usual force and held on simply as a dead weight, it being necessary to lift them into the boat with a landing net as they were brought up to the surface on the line. They floundered about the bottom of the boat in the usual fashion, until a well-aimed blow on the top of the head rendered them quiet. Afterwards we cut

³ Proc. U. S. Nat. Mus., XIV, 1891, pp. 83-94.

them open and examined the viscera. The "uterus," or membrane containing the young, was well developed as two long sacs nearly a foot in length. Each sac was well supplied with veins and arteries. After cutting a pair of these sacs open the young were found folded about one another, and all moved slightly. Each young shark was found furnished with a long umbilicus, as long, or longer, than the length of the embryo. It was attached to the walls of the sac by a placenta which much resembled a clot of blood and was an inch or more in diameter. The walls of the sac were elastic and of rather thick membrane, also somewhat spongy in texture. The young sharks would all wriggle about and finally break away. When some were thrown overboard they swam slowly away, or sank out of sight. All were perfectly formed and of about uniform size, with characteristic dark blotches about the tips of the dorsals and caudal. In size they were about 225 mm. in length. One female we opened was parasitized with a number of external copepod crustaceans (*Pandarus sinuatus*), which were quite active, moving about over the back and fins of their host. The gestation of this shark I had not noticed previously, although I had reported⁴ it from the observations of my friend, Dr. Richard J. Phillips, at Corson's Inlet, N. J.

The accompanying figure shows a view made from life of one of the uterine sacs dissected out, with the young sharks attached.

Raja eglanteria Lacépède.—Magothy Bay and Smith Island.

Dasyatis say (Le Sueur).—Smith Island.

Pteroplatea micrura (Schneider).—Several caught in the hauling-seine, the larger ones about 1320 mm. wide, near Smith Island.

⁴ Science, XXX, December 3, 1909, p. 815.

Anguilla rostrata Le Sueur.—Long Point Island and Magothy Bay.

Chrosomus oreas Cope.—Abundant at Midway Mills.

Semotilus atromaculatus (Mitchill).—Midway Mills and Piney Creek.

Leuciscus vandoisulus Valenciennes.—Midway Mills.

Rhinichthys atronasmus (Mitchill). — Midway Mills and Piney Creek.

Hybopsis kentuckiensis Rafinesque.—Piney Creek.

Fundulus majalis (Walbaum).—Long Point Island, Magothy Bay and Smith Island.

Fundulus heteroclitus macrolepidotus (Walbaum).—Long Point Island and Smith Island.

Lucania parva (Baird).—Long Point Island.

Cyprinodon variegatus Lacépède.—Long Point Island and Magothy Bay.

Menidia menidia notata (Mitchill).—May 12 we found bunches of spawn in the meadow grass, just below high tide, along the shores of Magothy Bay at Long Point Island. Also a number of dead fish were found in the trash and debris washed above tide-mark. These had all spawned several days before, as they were all quite fresh. Mr. George Skidmore, who reported seeing a large school spawning in this locality on May 1, was attracted by the great number of fish congregated, which were apparently to the number of several thousand individuals, all collected at high water over the grass. At this time the water was but several inches deep, and the fish occupied an area of a hundred or more square feet. The water for a still greater area was all white with the expelled milt of the males, so that it had a conspicuous milky appearance. All the fish were greatly agitated, tossing and tumbling about.

As the tide went down they all moved off-shore with it, and the eggs were left attached or screened by the grass on the dampened shore to await the return of high water. Doubtless the greater part of these eggs perish or are devoured by crabs, birds, etc. In color the eggs are pale or somewhat transparent, but mostly become more yellowish with age. In size each egg is about as large as number four shot. We found but few of these fish elsewhere during our stay, and conclude they were all in deeper waters.

Mugil curema Valenciennes.—Magothy Bay.

Hippocampus hudsonius De Kay.—Smith Island.

Lepomis auritus (Linnæus).—Piney Creek.

Lepomis incisor (Valenciennes).—Piney Creek.

Bolcosoma nigrum olmstedii (Storer).—Piney Creek.

Bolcosoma longimanus (Jordan).—Midway Mills.

Orthopristis chrysopterus (Linnæus).—Cape Charles City, Magothy Bay and Smith Island.

Cynoscion regalis (Schneider).—Cape Charles City, Magothy Bay and Smith Island.

Cynoscion nebulosus (Cuvier).—Cape Charles City and Smith Island.

Bairdiella chrysura (Lacépède).—Cape Charles City, Magothy Bay and Smith Island.

Leiostomus xanthurus Lacépède.—Cape Charles City, Magothy Bay, Smith Island and Long Point Island.

Micropogon undulatus (Linnæus).—Cape Charles City, Magothy Bay and Smith Island.

Menticirrhus americanus (Linnæus).—Cape Charles City, Magothy Bay and Smith Island.

Tautoga onitis (Linnæus).—Magothy Bay.

Spheroides maculatus (Schneider).—Magothy Bay and Smith Island.

Paralichthys dentatus (Linnæus). — Cape Charles City, Magothy Bay and Smith Island.

Opsanus tau (Linnæus).—Magothy Bay.

Gobiosoma bosc (Lacépède).—Long Point Island, under oyster clusters.



